THE SCIENCE NEWS-LETTER

A Weekly Summary of Current Science

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DEATH-DEALING AND LABOR-SAVING RAYS

Chemists in various parts of the world are busy trying to break open the safe that contains the most wealth of any in the world. This safe is the atom. For wealth is the product of work and work is the application of energy, and the most powerful and concentrated form of energy consists of the balanced forces of the positive and negative electrical particles inside the atom.

These forces are most intense in the nucleus of the atom, the sun of the atomic system. The atom of radium is in an unstable state and occasionally throws off a fragment from its nucleus with a velocity of ten thousand miles a second. This speed is twenty thousand times faster than a rifle bullet, and consequently its energy is four hundred million times greater than that of the bullet, mass for mass.

Now if it were possible to excite a similar instability in the atoms of other elements than radium, we might get enormous streams of energy out of them. Is it possible? Most scientists today are disposed to doubt it.

But at least one reputable electrician, Dr. T. F. Wall, of Sheffield University, England, thinks that it can be done and he is trying to do it. His apparatus is based upon a simple principle that is familiar to everybody who has played with a coil of wire and a magnet. Sticking the magnet into the coil starts an electric current, that is to say, a stream of electrons, running through the wire, and conversely, running an electric current through the wire will create a magnetic field inside the coil.

Now the electrons, revolving in their orbits around the nucleus like the current in the coil, must produce a powerful magnetic field. Conversely, we would suppose that if we brought more powerful magnetic forces to bear upon the atom, its electrons would be disturbed in their orbits and perhaps even driven out of the atomic system altogether. If, for instance, a giant star with more gravitational force than our sun should wander into our vicinity, it would create a commotion in our solar system and perhaps a scatteration of the planets.

But the magnetic field inside the atom is vastly more intense than any that has hitherto been produced artificially. How then can we hope to upset its equilibrium? But Dr. Wall has the idea that the rapid and rhythmical repetition of even a weaker power may derange the revolutions of the electrons, just as a suspended cannon ball may be set swinging by repeated taps with a light mallet.

By passing an extremely powerful oscillating current through a coil, he hopes to get a sufficiently intense magnetic field inside the coil to overpower and counteract in some measure the magnetic field inside the atoms. From static condensers of large capacity and high voltage, he obtains a current of 50,000 amperes, but as it runs only a fraction of a second, it does not burn up the wire. With this apparatus he is able to obtain a field amounting to some millions of magnetic units.

Dr. Wall is reticent about his results [illegible]

of his experiment and is possibilities. In the latest number of "Discovery" he says. "Quite frankly stated, the ultimate aim is definitely to disturb the atomic structure for the purpose of releasing some or all the latent energy of the atom."

Since he has been credited - and discredited - in the press with the design of producing a "death ray", it is well to quote his own words on this point. He says that the energy so released from the interior of atoms "presumably would be in the form of raysof energy of some possibly quite unknown type". The possibility of their application to warfare would be a serious national concern for:-

> "It is reasonable to suppose that if intense magnetic fields are found capable of releasing the atomic energy, similar magnetic fields may provide the solution for the control, and concentration of the released energy in the form of a ray or beam like the beam of a searchlight. If this is found practicable it would probably result in a very simple control apparatus. Such a ray or beam of energy when directed on any given object would possibly be capable of yielding up its energy in the form of heat, thus superseding the use of coal, oil or other fuel. What, however, is far more probable is that new forms of motors would be developed which would be able to use the energy of the beam directly without the need of any intermediate conversion into heat."

We must admit that Dr. Wall has reason for his surmise that in the present temper of the human race such a new found force would be first applied to the killing of human beings and the destruction of their property. But other inventions, quite as affrighting at first sight, have in time been tamed and set to the service of man. The weapons of Mars ultimately become tools in the hands of Minerva.

But it would be premature to worry over its possibilities in warfare or to rejoice over its potentialities in industry until it is proved that such a form of radiant energy can be produced in quantity from the atom and that it does not require more energy to release it than can be obtained from it.

ARTIFICIAL EARTHQUAKES TO AID IN FINDING OIL

Artificial earthquakes, produced by detonating large charges of explosives, are the latest aids invoked by the oil geologist in his search for petroleum-bearing rock formations. Dr. L. Mintrop, a German seismologist, is the originator of the method.

Oil pools are usually found in or under the dome or ridge of an "anticline", or inverted V-shaped fold of deeply-buried rock. It is important therefore to know the direction and degree of slope of the layers in a rock formation where oil is to be sought.

Dr. Mintrop's method depends on the fact that earth tremors, upon stirking a massive layer of rock, are reflected in much the same fashion as waves in a pool striking the shore, or like sound waves striking a cliff and producing an echo. A Heavy charge of explosive is fired, and the resulting ground waves are recorded by portable seismographs set up at suitable distances. The characteristics of these reflected waves, particularly the amount of extra time they have required to reach the instrument as compared with the waves which have travelled direct without reflection, furnish data for calculating the inclination of the rock strata.

The process is repeated several times, until enough information is gathered to tell whether or not the folds in the rocks underground are favorable for the location of oil.

This method of locating rock strata, and calculating the amount and direction of their slope, it is pointed out, is especially advantageous in level regions where there is a thick blanket of surface soil andwhere there are no mountains or rocky ledges to give the geologist a hint of the kind and arrangement of the subterranean rock structure.

NO "HYPNOTIC CRIMINALS" FRENCH PHYSICIAN ASSERTS

Claims that crimes have been committed by one person at the hypnotic bidding of anothermust be relegated to the field of purefiction, according to Dr. Delboeuf, a French physician who has made a study of the subject of hypnotic influence.

Dr. Delboeuf tells of an experiment that seems to be conclusive. He had one man whom he frequently used as a subject, who could readily be persuaded, while in the hypnotic state, that a stick or bottle or any such object was a pistol, and upon being commanded would "shoot" any other person with the mock weapon. But when a real revolver, which the subject in his conscious state had always known to be loaded, was placed in his hands, he would not pull the trigger, though he was hypnotized at the time and the weapon was empty.

Dr. Delboeuf is of the opinion that naturally moral persons will not perform under the hypnotic state any acts which are inhibited by their conscious moral codes. He believes also, however, that a person of criminal tendencies might commit a crime while hypnotized, since the idea of crime is not repugnant to his conscious mind.

DAY IS GROWING LONGER, ANCIENT ECLIPSES SHOW

That the day, or period during which the earth makes one complete rotation on its axis, is slowly growing longer, is a discovery due to the study of ancient eclipses, according to Prof. Ernest W. Brown, of the departments of mathematics and astronomy in Yale University.

Not that we need to expect the earth to start wobbling like a run-down top, and finally quit spinning altogether. If such a thing happens it will be exceedingly remote, for Prof. Brown explains that the slowing down and consequent lengthening of the day, will amount to only about one-tenth of a second in a thousand years. But the detection of so small a change over so large a period of time is in itself a triumph of mathematical astronomy.

The first indication that something was the matter with the rotation of the earth was noticed over two centuries ago by the great English astonomer Halley, who found that he could not reconcile the motion of the moon as it was then known with its motion many centuries earlier. Two theories were advanced, during the times that followed, to account for the discrepancy: one, that the attraction of other planets though small was still sufficient to account for the change; the other, that the friction of the tides of the seas was slowing down the earth. During the past decade exact calculations have shown that oceanic friction really does account for the phenomenon. Curiously enough, two-thirds of the total braking effect of water on the earth's rotation is concentrated in a single body of water, the Bering Sea.

NATURAL COOK STOVE RUNS FIVE YEARS WITHOUT FUEL

A cook stove built by the National Geographic expedtion to Mt. Katmai five years ago was found and used by an explorer this fall. It was as hot as ever and cooked food perfectly, without fuel or smoke. The stove is a two-foot hole dug out of a boiling fumarole of steam in the valley where over a thousand of the steaming potholes are located. The discovery of this cook hole and its identifying mark prove that the volcanic regions about Mt. Katmai are not cooling to a perceptible degree.

RESERVE OXYGEN STORED IN FISH'S SWIM-BLADDER

That the swim-bladder of fishes is not only an organ of flotation and balance, but may also be a tank from which a reserve of oxygen may be drawn in emergencies, is one of the results indicated by the researches of Dr. F. G. Hall of the University of Wisconsin.

"When fishes were kept in water containing little or no dissolved oxygen, the oxygen in the swim-bladder was reabsorbed, indicating that this organ may be used as a reservoir on which the blood may draw," says Dr. Hall. "The effect of increased pressure in the water surrounding the fish was t o increase the percentage of both oxygen and carbon dioxide within the swim-bladder. If carbon dioxid was increased in the water, the volume of the fish was increased, and it was thus caused to rise toward the surface."

This discovery of the possible usefulness of the swim-bladder of ordinary fishes as an organ of breathing is of interest in connection with the study of the evolution of lungs in other animals. A connecting link between fishes and frogs is the tropical "lungfish", in which the swim-bladder is surrounded with a thick net of blood vessels and is obviously the beginning of a true lung, which enables the fish to store enough air for its sluggish life processes during the dry seasons, when it "aestivates" rolled up in a ball of mud. The lungs of amphibians, like the frog and newt, and even of the reptiles, which are the next upward step in the scale of life, are still sac-like, and more or less reminiscent of the presumably ancestral swim-bladder.

SUPERSTITIOUS INDIAN CHIEFS PROTECT DESTRUCTIVE COYOTES

Superstitious Indians of the Klamath reservation in Oregon are the means of a great increase in coyotes and the consequent loss of live stock. An ancient chief of the tribe, suspected of molesting government traps, is reported to have admitted that elders still belived they assumed the form of coyotes after death, and the rapid killing of these animals meant the extermination of their brethren. Well laid plans of government hunters have thus been undone.

A radio course in educational psychology carrying college credit is being broadcasted by the University of Kansas.

The serpent has been adored as a god in practically every country of the world

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SEMI-PRECIOUS STONES MARK DEATH BEDS OF EXTINCT BIRDS

Little heaps of semi-precious stones, scattered over the plains and hills of New Zealand, mark the last resting-places of the moas, gigantic ostrich-like birds only recently extinct. The moa, which was the largest bird that ever existed, carri pebbles in its gizzard, just as ordinary chickens do, to grind up its food. Since it lived largely on tough twings of bushes, it needed especially hard stones. Where it lay down to die at last, the pebbles endured after even its bones had disappeared. Hence the little heaps of rounded chalcedony, quartz, chert, jasper and qaartzite, ranging in size from 2½ inches in length and 2 ounces in weight downward.

Prof. W. T. Lee, of the U. S. Geological Survey, who calls attention to this phenomenon, comments on the good judgment of these extinct birds in choosing jewel stones for use in their lapidary mills. "By judicious selection of material, these first families among diamond cutters handed down lasting memorials to admiring posterity," is the way he puts it. Prof. Lee also calls attention to the similarity in habit between these ancient birds and the still more ancient dinosaurs, who also swallowed hard semi-precious stones to grind their food. Collections of such stones have been found associated with dinosaur fossils, in approximately the spots where the monster lizards' stomachs found repose. The gizzard-stone habit persists among modern reptiles in the crocodile family who are also rock-eaters.

ADULT CHIGGER NOT DANGEROUS TO MAN

The adult chigger has been isolated, experimented with, and petted by Dr. H. E. Ewing of the Smithsonian Institution. He has discovered that they are only troubl some to man in a very early state and when grown make nice household pets.

Unfortunately, his chigger, which he raised from a mite, produced young which had the usual annoying characteristics. He hopes, however, to keep the adult alive for the Christmas meeting of the entomologists. In hislong study of the chiggers he has found that they need a great deal of water to live, being almost amphibious. As a result of his experiments the ordinary American chigger has been exonerated in the matter of carrying diseases. The Japanese chigger, however, is held responsible for spreading flood fever.

He has another rather risky pet in a California tarantula which he keeps ina cage. He finds that the animal isnot dangerous to handle if he is approached quietly and not frightened. Dr. Ewing has been feeding him grasshoppers and cockroaches on which he seems to thrive.

SEX RATIO OF OFFSPRING VARIES WITH SEASONS

Why are there more boy babies then girl babies, Dr. F. A. E. Crew, director of the animal breeding research department ofEdinburgh University, has been striving to find an answer to this question.

He has studied thousands of birth records, human and animal. He finds that the relative number of males and females among the new-born young are influenced by the time of year that the mating takes place, the size of previous family, and the interval that has elapsed since the last birth.

In all the higher animals, man included, the number of males and females born runs nearly, but not quite, equal. There is always a slight preponderance in favor of one sex or the other, which varies from species to species. Thus in the human race, the ratio of boys to girls is between 103 and 107 to 100. Among horses, female colts are morenumerous than males, the male-female ratio being 98 to 100; and the same ratio prevails among sheep. Happily for those who are in the egg business, pullets are more numerous than cockerels at hatching, with a ratio of 95 male chicks to 100 female chicks. But with pigeons the numerical supremacy of the males is restored, with a ratio of 115 to 100.

The sex-ratio varies with the seasons of the year. A study of the birth records in greyhound kennels shows that December breedings produced 88 male puppies to 100 females, while the ratio male to female for September breedings was 122 to 100. Similar records show that the offspring of warm-weather matings among horses were in almost the same proportions as those of cold-weather matings, but that other farm animals showed a wider range. Among cattle the warm-weather ratio was 114 to 100, as compared with 103 to 100 when the mating took place in the fall and winter. Sheep showed a ratio of 102 to 100 for the warm months as compared with 94 to 100 for the cold, and pigs showed ratios of 115 to 100 and 109 to 100, respectively, for summer and winter matings.

MICROSCOPIC SURGERY DONE WITH FINE GLASS NEEDLES

Dissection so fine, and done with such fine tools, as to be possible upon single cells as small as three thousandths of an inch in diameter, is being practiced by Dr. Henry J. Fry of New York University. His instruments are fine glass needles of his own manufacture, drawn out to a point almost invisibly slender, and his operating stage is the field of a microscope. Heretofore work of this kind has been done only with specialmachines. Dr. Fry does not claim that his method will do away with these microdissection machines, but states that for many kinds of scientific work the operations can be carried on with much greater freedom and rapidity, yet without sacrificing necessary accuracy.

SEEKS COW'S ANCESTORS IN SOUTHEASTERN ASIA

In quest of rare species of wild oxen, believed the prehistoric ancestors of the docile cow of today, Harold A. White, big game hunter of New York, has sailed for thw wilds of French Indo-China.

"Wild oxen roamed Europe and Asia tens of thousands years ago before the dawn of civilization," said White. "The herds gradually disappeared until the original stocks are now hidden in the thickets of Indo-China. There are two species there, the "selading" and the "banting", both bovines but with different horn structure.

"With native helpers I will attempt to capture pairs of male and female, and calves of each species for the eastern zoos, for at present none of these animals is in captivity. The wild oxen, according to the best information I can obtain, are now found in the state of Loas, as yet little explored and a paradise for other big game. The land is inhabited by a half savage people known as Mois, from whom historians think arose the Moros of the Philippine islands.

"A white tiger, leopards, rhinos, and other large animals also roam the jungles of Indo-China."

"MUSCLE SHOALS" IS MERELY A MISSPELLING

That the correct name of the much disputed dam site on the Tennessee river should be "Mussel Shoals" instead of "Muscle Shoals", now accepted as the official spelling, is the contention of Prof. A. E. Ortmann, of the Carnegie Museum, Pittsburgh. The stretch of shallow, rapid water now backed up by the power dams received its name years ago from the vast quantities of mussels, or freshwater clams, that lived on its bottom. Collections of shells made there in former years represented not less than eighty species and varieties. The building of the dams, however, has so disturbed natural conditions that very little is left of the original mussel beds.

LARGE SCALE EXPERIMENT SHOWS CLOSE INBREEDING NOT HARMFUL

The largest-scale inbreeding experiment ever conducted has failed to show any disadvantage in the mating of close relatives, provided the stock is good to start with, according to results just announced at the Wistar Institute of Anatomy and Biology of the researches of Dr. Helen Dean King.

Dr. King's investigation dealt with the data for twenty-five successive generations of albino rats, comprising over 35,000 individuals, that were obtained by the closest form of inbreeding possible in mammals -- the mating of brother and sister from the same litter.

"Comparisons made between inbred and stock animals, reared under similar conditions of environment and of nutrition, show unmistakably that inbred rats are larger, more fertile, and that they attain sexual maturity earlier and possess greater vigor of constitution than do stock animals", states Dr. King.

"The conclusion is drawn that inbreeding per se is not injurious, provided that the animals inbred are of sound stock and that there is a careful selection of the individuals that are used for breeding."

CANCER OF ESOPHAGUS TRACED TO WORRY

That cancer of the esophagus is frequently brought on by worry is the claim of Dr. D. Guisez, eminent French specialist on cancer, who has made a study of this form of the disease for many years. In an address before the Royal Society of Medicine in London, Dr. Guisez stated that in more than half the cases examined by himself and his colleagues, psychic causes could be assigned. Among these he mentioned the death of a near relative, loss of money and loss of position. Many war veterans had developed the disease following the severe mental strains of active service.

Dr. Guisez explains that the esophagus readily develops a spasmodic contraction from emotional causes. In this state it prevents the passage of food, which lodges in it and sets up irritation; and canderous degeneration follows. The early stages of this form of cancer are rarely seen by physicians, because there is little pain or discomfort until it reaches an advanced stage.

Stomachache in children may be a symptom of appendicitis.

AGRICULTURE DEPARTMENT STARTS MENTHOL CULTURE

An all-American cold cure, based on home-grown menthol, is a possibility held out by the Bureau of Plant Industry of the U. S. Department of Agriculture. Inasmuch as menthol is now imported at a cost of more than a million dollars annually, government botanists point out that menthol-bearing mint plants can be made a profitable crop if properly cultivated in regions where the climate is suitable. Experimental plantings in various parts of the United States during the past year have shown that the mint does not produce a high enough percentage of menthol in southern states, but in the cooler and moister northern states its culture can be made to pay.

WXTRACT ODOROUS OIL FROM CIGAR BOX WASTE

Cedar oil can now be produced in paying quantities from shavings and waste wood in cigar box factories, by a process worked out in the laboratories of the Bureau of Plant industry, U. S. Department of Agriculture. The oil can be used with cheaper, odorless woods, to make the aromatic boxes insisted on by cigar manufacturers. This discovery is expected to be of importance to the cigar industry, for the small West Indian cedar from which cigar boxes are made is becoming increasingly scarce. The cost of obtaining the oil is relatively small, and after its extraction the waste can still be used, as at present, for fuel.

FLUTES, BUT NO DRUMS, USED BY WHITE INDIANS

Music unique among primitive peoples in that no drums, tom-toms, or other similar instruments are used, is the artistic possession of the White Indians of Darien, Panama, according to Miss Frances Densmore of the Smithsonian Institution.

"Their music is exceedingly poetic, and the language of their songs is descriptive and beautiful," said Miss Densmore. "Their principal instruments are constructed on the order of flutes, on which they are skilled performers. They also use gourd rattles, and conch-shells as trumpets. Like their spoken language their music has no counterpart in the arts of other Indian tribes thus far studied."

Miss Densmore is a leading authority on the music of the North American Indians and has built up a large collection of phonographic records of tribal songs for the National Museum. She has been concentrating lately on the White Indians, brought to this city by R. C. Marsh, and has recorded musical narratives, songs for festivals, marriage ceremonies, and many other of their forms of music.

CHRISTMAS GREENS BEING WIPED OUT

Holly, winterberry, mountain laurel, ground pine, and a number of other plants used in Christmas wreaths and garlands are being used so fast that unless the present generation becomes more moderatein its demands there will be none left for the Christmasses of the next, is the gist of a warning issued by P. L. Ricker of the Wild Flower Preservation Society.

"Of all woody plants in the East, holly and its close relative winterberry are in the greatest danger of extermination," says Mr. Ricker. "Around large towns

where they were formerly common one has to go farther away each year to find them, and most of the holly that reaches the market has been stolen. The problem is so serios that immediate steps for its cultivation are urged."

Another seriously threatened plant, Mr. Ricker states, is the ground pine which forms the basis of most Christmas garlands. Unlike the holly, this plant can not be successfully cultivated, and the only thing that will save it from eventual complete destruction is greater moderation in its use. The Society strongly advocates the substitution of artificial garlands to as great an extent as possible, and the use of cultivated and potted plants, like dwarf orange, poinsettia and Jerusalem cherry, to replace branches cut from the woods.

MASSACHUSETTS BIRDS FACING DESTRUCTION

Once numerous colonies of gulls, terns, and herons on the shores of Massachusetts are in danger of being wiped out. Various influences of civilization disturbed the well-being of the colonies to begin with, and now skunks, stray cats and human marauders are threatening the remainder. Even ants are adding to the troubles of the birds, for in some cases they have been found attacking and devouring the young as soon as they were hatched from the egg.

The state is unable to give sufficient protection to the birds, and the Federation of the Bird Clubs of New England is undertaking to supplement official action. They are endeavoring to raise sufficient funds to provide the needed extra wardens and other protection before the beginning of another breeding season.

WOULD MAKE TRAINS STOP AT DANGEROUS CROSSINGS

To cheat death at grade crossings in Washington, railway rolling stock should be painted a bright color and compelled to stop to let automobile traffic clear the way, according to proposed state highway traffic law for enactment by the coming legislature.

"There are hundreds of automobiles to every train that goes over a grade crossing," states the first draft of the measure, "the machines may stop - wise drivers always do - but the trains do not. Accidents also occur because the railway coaches being painted green, the same color as the scenery, are hard to see during the daytime and impossible at night or in a fog. Change this to yellow or white, make the trains top, and grade crossing fatalities and mishaps will be cut a hundredfold. "

CARNEGIE INSTITUTION ELECTS NEW TRUSTEES

The board of trustees of the Carnegie Institution of Washington at their annual meeting elected four new trustees, to fill vacancies created during the past year by the deaths of the late Senator Henry Cabot Lodge, of Dr. Robert S. Woodward, formerly president of the Institution, and ofCharles L. Hutchinson, formerly president of the Corn Exchange National Bank, of Chicago; and by the resignation of Cleveland H. Dodge, of the Phelps Dodge Corporation, of New York City.

The new trustees are Andrew Mellon, Secretary of the Treasury, Senator-elect F. H. Gillett, William B. Storey, president of the Santa Fe Railway, and Cass Gilbert, New York architect.

TABLOID BOOK REVIEW

EPIDEMIOLOGY AND PUBLIC HEALTH: By Victor C. Vaughan, M.D., LL.D. Vol. I, 688 pages, 1922. Vol. II, 917 pages, 1923. Vol. III in preparation. St. Louis: C. V. Mosby Company.

These three volumes will be foundation-stones of the newly-differentiated science of public health. Encyclopedic in their scope, and bringing down to date everything now known about epidemic diseases and their prevention, botulism and kindred food poisonings, protection of water and milk supplies, and a host of related subjects, they are no less than necessities upon the reference shelves of all who sign themselves "Dr. P. H.", as well as of progressive practitioners of the older and parent arts of medicine and surgery. The thorough-going discussions of recent epidemics illustrated with clear and striking graphs and charts, will appeal to the public health man, while the careful symptomologies of even obscure diseases and toxic effects will be highly useful to the physician. Each chapter is followed by the appropriate bibliography, and each volume is thoroughly indexed.

GOLD AND SILVER JEWELRY AND RELATED OBJECTS: CATALOGUE OF EGYPTIAN ANTIQUITIES Numbers 1-160: By Caroline Ransom Williams, New York: The New York Historical Society. 1924. 281 pages; plates I-XXXVIII. $10.00.

Purporting to be simply a formal catalog of Egyptian art antiquities, this work of Dr. Williams turns out to be an enthrallament to those who delight in beautiful things, and a challenge to those who make them. One hundred and sixty objects of gold and silver--jewelry for women, for men, for the dead, for the gods--are passed in review before eyes that are at once critical and sympathetic, scientific and esthetic; and through them we see new vistas of the mystery and marvel of the old Egyptian craftsmanship. One especially challenging question is brought up by the fineness of much of the detail. Many of the pieces are ornamented with carving, chasing, applique work, both in formally ornamental pattern and in hieroglyphic inscription too minute to be seen with the naked eye, yet executed with a sureness and accuracy that modern jewelers achieve only through the aid of powerful magnifiers--if they achieve it at all. In preparing the plates, these details had to be photographed through a microscope. How did the Egyptians put them there?

Provision is made in the will of Andrew W. Preston, late President of the United Fruit Company, that in the event of the death of all his heirs his entire estate, $6,000,000, will be used for the advancement of the science of chemistry in the United States.
